I. Condition Assessment and Problem Description

Geographic Region of Interest

The area of this Water Quality Restoration Plan (WQRP) is that of the Bureau of Land Management (BLM) Upper Siuslaw Late-Successional Reserve (LSR) Restoration Plan (hereafter referred to as the LSR Restoration Plan), which addresses restoration within the Upper Siuslaw portion of LSR 267. BLM, in cooperation with the U.S. Fish and Wildlife Service, has prepared an environmental impact statement (EIS) that analyzed impacts of the LSR Restoration Plan (USDI BLM 2004). The entire LSR 267 includes 175,280 acres of federal land managed by the BLM Eugene, Roseburg, and Coos Bay Districts and the Siuslaw National Forest (see Map 7 – note that maps attached to this WQRP are numbered consistent with the larger map set in the EIS). The Eugene District manages approximately 83,000 acres (47%) of LSR 267. Of this total acreage, 24,400 acres are within the Upper Siuslaw sub-unit (14% of LSR 267), which will be addressed by this WQRP (hereafter referred to as the planning area). The Upper Siuslaw sub-unit of LSR 267 extends from the eastern edge of LSR 267, just west of the Lorane Valley. The Upper Siuslaw sub-unit extends west to Oxbow Creek (see Map 10). The northern boundary is defined by the ridge between the Siuslaw and Wolf Creek watersheds. The southern boundary is defined by the boundary between the Eugene and Roseburg Districts, which approximates the ridge between the Siuslaw and Umpqua River basins (although a very small portion of the Upper Siuslaw sub-unit of LSR 267 extends into the Umpqua River basin). Much of the planning area is privately owned (see Table 1).

Table 1. Land ownership in the LSR Restoration Planning Area.

Land Owner	Acres	Percent (%) Ownership
BLM LSR	24,400	42.5
BLM Matrix	3,600	6.3
Other public (State, County)	400	0.7
Private	29,000	50.5

Beneficial Uses

The beneficial uses that have been identified in this watershed are identified in Table 2.

Table 2. Beneficial Uses in the Siuslaw Watershed.

Beneficial Use	Occurring
Public Domestic Water Supply	
Private Domestic Water Supply	X
Industrial Water Supply	
Irrigation	X
Livestock	X

Anadromous Fish Rearing	X
Salmonoid Fish Passage	X
Resident Fish & Aquatic Life	X
Wildlife & Hunting	X
Fishing	X
Boating	
Water Contact Recreation	X
Aesthetic Quality	X
Hydro Power	
Commercial Navigation	

Current Conditions

Upper Siuslaw Watershed water quality limited stream segments and parameters identified on the 2002 Oregon 303(d) List are show in Table 3.

Table 3. Water Quality Limited Streams in the Planning Area.

Waterbody	River Mile	Parameter	Season	List Date
Siuslaw River	5.7 to 105.9	Dissolved Oxygen	September 15 - May 31	2002
Siuslaw River	5.7 to 105.9	Dissolved Oxygen	June 1 - September 14	2002
Siuslaw River	20 to 105.9	Temperature	Summer	2002

The Siuslaw Watershed Analysis details terrestrial and aquatic ecosystem conditions and processes within the Siuslaw River fifth-field watershed (USDI BLM 1996). The Siuslaw Watershed Analysis includes a stream-by-stream analysis of current fish habitat conditions (USDI BLM 1996, pp. II-38 – II-47). Additional description of current stream conditions is presented in the Upper Siuslaw Aquatic Habitat Restoration Plan (Environmental Assessment OR090-98-17).

Climatic patterns in the region are dominated by cyclonic winter storms depositing over 40 inches of rain per year. In an average year, 80% of the precipitation falls as rain during the November - February period.

The Siuslaw headwater streams are at elevations of 1000 feet or less. The Siuslaw River has a low gradient along its entire course. The elevation change from the union of the North and South Forks of the Siuslaw near Lorane to the outlet into the ocean over 110 river miles away is less than 500 feet. Unlike the typical river pattern where the gradient decreases as the river increases in size and flow, the Siuslaw has no major changes in gradient along its entire length. Within the WQRP area, the Siuslaw River floodplain is narrow, with variable confinement bordered by steep slopes. Tributaries are generally steep and confined, with little valley development.

Most of the Siuslaw basin is dominated by sedimentary oceanic deposits of siltstone and sandstone. The sedimentary materials have very limited permeability and little capability to store or transport water. Most of the water movement in the sedimentary materials is at the seams. Most of the groundwater storage occurs in the shallow soils and in the valley bottom alluvium. Because of the limited water storage capacity, the stream flows are closely tied to precipitation patterns (see Table 4). Steams show considerable seasonal and long-term variation in flows. Peak flows are often more than 100 times greater than low flow discharges.

Table 4. Monthly Statistics Based on Mean Daily Discharge.[1]

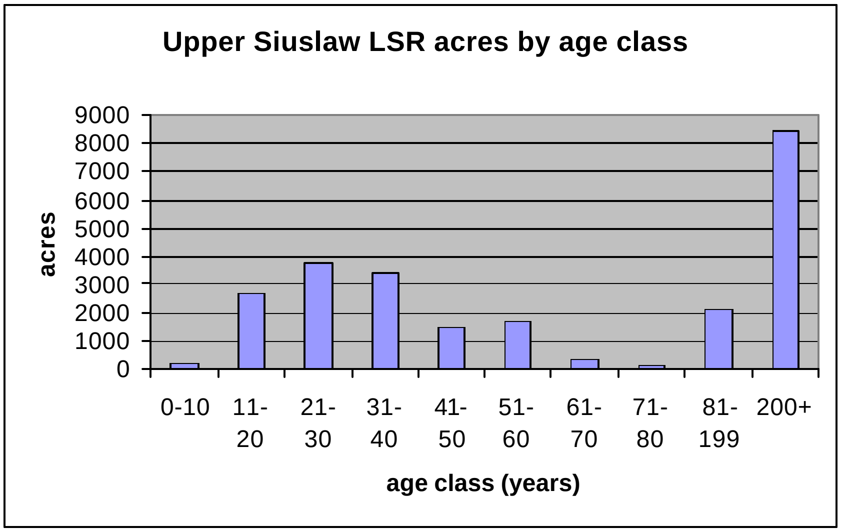
Month	Minimum	Maximum	Average	% Annual Runoff
Oct	19	249	92	1.80
Nov	57	1596	514	9.70
Dec	53	1998	1073	20.90
Jan	61	2061	1020	19.80
Feb	179	1853	961	17.00
Mar	263	1392	720	14.00
Apr	140	908	433	8.10
May	110	429	212	4.10
Jun	65	253	116	2.20
Jul	26	128	55	1.10
Aug	16	66	32	0.60
Sep	18	73	40	0.70

[1] Adapted from USGS, 1990.

Past timber harvest and road systems led to major changes in aquatic habitat in the basin, including the loss of large woody material from stream channels and the removal of large trees from riparian areas. Riparian areas have been further fragmented by the extensive road network, which parallels all major streams and is a chronic source of sedimentation. The loss of large woody material from stream channels has resulted in stream downcutting: the Siuslaw River and most of the major tributaries are 2 - 10 feet below their historic levels. The Siuslaw River along many reaches has downcut to bedrock, causing increased channelization and secondary confinement of the flow, increasing peak flow velocities, and reducing habitat diversity. Channel incision also has contributed to a decrease in the water storage capacity of the basin, loss of pool and off-channel fish rearing habitat, decreased connection to riparian areas, and an increase in summer water temperatures. Tributaries show some of the same patterns of channel downcutting. For many tributaries, the lowering of the Siuslaw channel created an elevation discontinuity, leading to rapid downcutting of the tributary stream channel.

Current vegetation conditions are presented in Map 8. More than half of forest stands in the WQRP area are >80 years old (see Figure 1 and Map 8). Almost all stands in the planning area <60 years of age have been regenerated following timber harvest, and most have been either seeded or planted, and then pre-commercially thinned.

Figure 1. Forest Age Classes in the Planning Area.



Recent Aquatic Restoration

Aquatic enhancement efforts in support of the watershed analysis recommendations are ongoing. In 1998 and 1999, BLM placed hundreds of tons of boulders in a control location within the Siuslaw River channel to simulate six "cascades." The objectives of this type of structural installation included building up the confined, bedrock dominated river channel and creating the potential for groundwater recharging (replenishing groundwater reservoirs), connecting the river and the adjacent flood plain, and increasing the structural complexity of the Siuslaw River and tributaries. Additional objectives included creating deep pools for fish cover, improving the availability of spawning, rearing and refuge habitat, and increasing the water retention capacity in the upper basin during the low flow summer months. Increased aeration as water flows through the project areas is an emergent benefit on the project areas.

In 2000 and 2001, BLM focused aquatic restoration efforts on removing migration barriers to make additional habitat available to aquatic species in the following Siuslaw River tributaries: Oxbow Creek and tributaries; Frying Pan Creek and a tributary; Bear Creek; Haight Creek; Dogwood Creek; and Buck Creek. Six barrier culverts were removed and replaced with passage friendly culverts, one barrier culvert was completely removed, and a stream enhancement project in Frying Pan Creek placed logs and boulders as key structural habitat features. These projects opened approximately 8.5 miles of usable stream habitat to aquatic species.

Five major tributaries of the Siuslaw River within the planning area currently have adequate woody debris to provide stable in-stream structures on 3rd to 5th-order streams: Oxbow Creek, Doe Hollow, Dogwood Creek, Russel Creek, and Fawn Creek (see Map 10). Based on stream habitat surveys, BLM fish biologists have determined that 25 of the 45 miles of 3rd to 5th-order streams in the planning area are a high priority for aquatic restoration efforts. Of these priority streams, approximately 12 miles currently have adequate woody debris. Of the remaining 13 miles that lack sufficient woody debris, only 3.8 miles are accessible by heavy equipment to perform in stream restoration work (see Map 10).

Existing Sources of Water Pollution

Changes in stream channels have influenced water quality, with an overall increase in water temperatures and associated drop in dissolved oxygen saturation levels. This is due to loss of shading, exposure of bedrock with increased insolation, and loss of deep pools with their cooler groundwater interactions. Water temperatures may have also increased in some streams as a result of channel widening from increased sediment loading. When the amount of sediment entering a reach exceeds the transport capacity of a stream, the sediment is deposited. This can lead to the channel becoming wider and shallower. Channel widening increases in the stream surface area exposed to solar radiation.

Elevation of stream temperatures in forested watershed can increase following logging and road buildings (Brown and Krygier 1970; Brown 1980). Research has shown that shade-producing vegetation is an effective way to prevent elevated water temperatures and that riparian vegetation up to 100 feet from a stream may be effective in reducing solar radiation (Brazier and Brown 1972; Betschta et al. 1987). Tributaries in the planning area are well shaded, steep confined intermittent and perennial channels. The Suislaw River, due to its width and low gradient, is very susceptible to increased temperatures due to solar radiation. Canopy shade is not as significant a factor, with respect to stream temperature, in wide streams as in tributaries due to the increased width (Lewis et al. 2000).

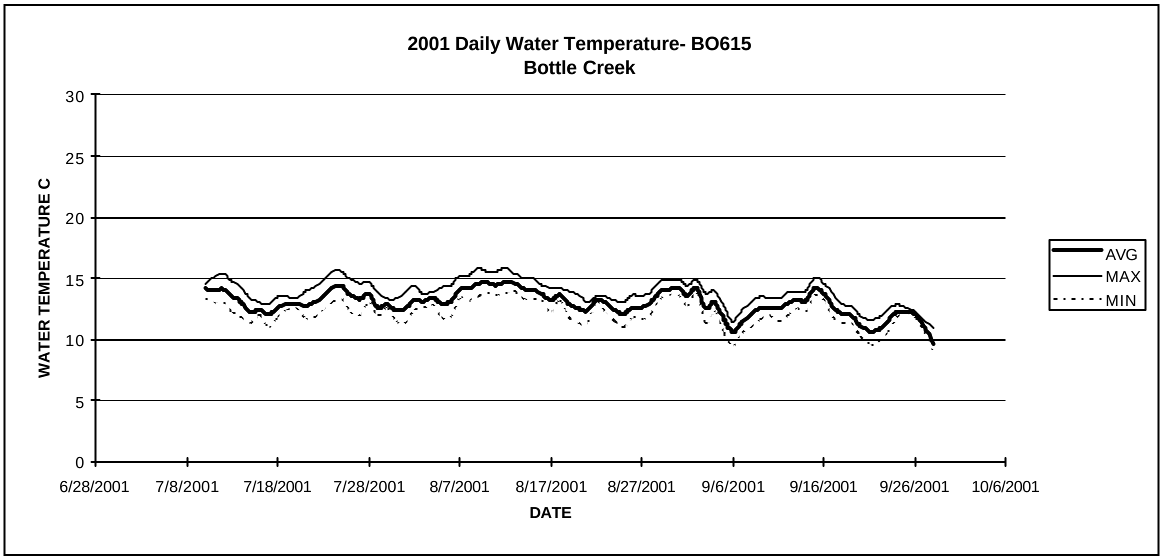
The 303(d) listing identified stream temperature as a water quality problem in the Siuslaw River in the planning area (see Table 3). Along many tributaries, growth of riparian vegetation has increased shading sufficiently to re-establish more normal temperature regimes. Table 5 depicts the highest 7-day moving average of the daily maximum temperature recorded during the 2002 monitoring period. Note that the tributaries are several degrees cooler than the mainstem Siuslaw River sites.

Table 5. 2002 Average Maximum Water Temperature for Siuslaw River and Tributaries.

Monitoring Site	Highest 7-Day Average Maximum Daily Temperature ($^{?}$C)
SI562	19.8
SI520	22.8
SI463	22.3
Bear Cr.	15.3
Doe Cr.	17.1
Doe Hollow Cr.	16.0
Haight Cr.	17.2

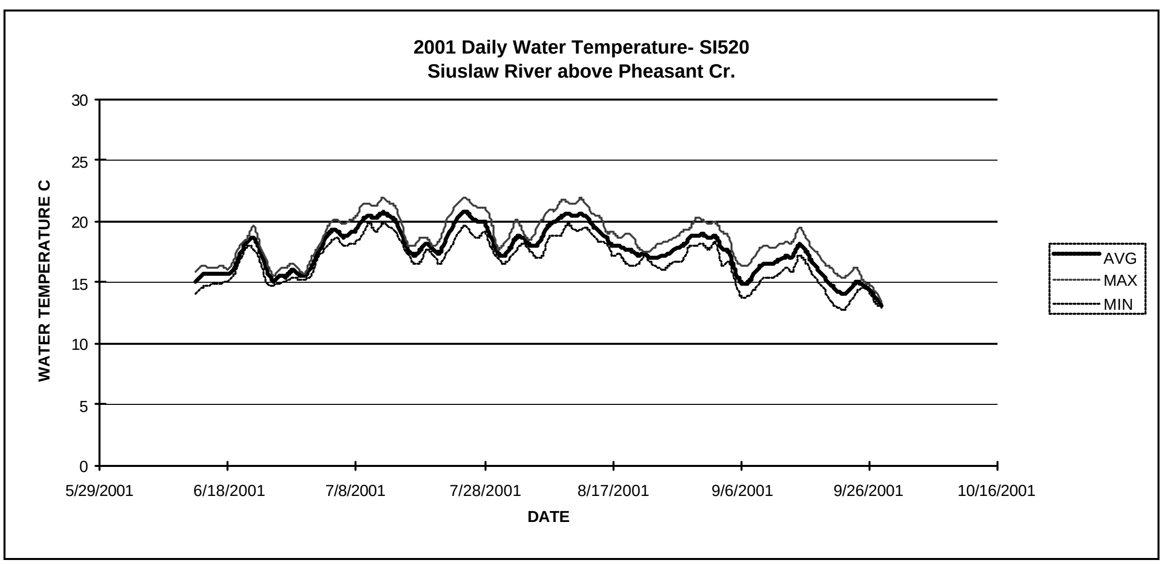
The Bottle Creek temperature graph is an example of a small stream temperature profile within the planning area (see Figure 2). Bottle Creek is typical of small streams within the planning area. The monitoring site received over 93% shade between March and September.

Figure 2. Bottle Creek Water Temperature.



However, in the Siuslaw River, the reduced groundwater interchange, dramatic increases in insolation due to exposed bedrock in shallow water, and the loss of streamside shade continues to produce high water temperatures. The Siuslaw River above Pheasant Creek is an example of a mainstem Siuslaw River temperature profile within the planning area (see Figure 3). This site received between 70% and 80% shade between March and September

Figure 3. Siuslaw River Water Temperature.



The primary source of fine sediment delivery to the stream system is chronic delivery from existing road surface erosion. Episodic delivery from landslides resulting from culvert failures during storm events may infrequently provide large deliveries of sediment to streams. Temporary pulses of sediment from culvert replacement or removal, in-stream aquatic habitat restoration projects, road decommissioning, and new road construction provide minor quantities of sediment delivery.

The Siuslaw Watershed Analysis estimated that road related sedimentation represents only an approximately 5% increase over natural background levels (USDI BLM 1996, pp. II-7, II-8). The 2002 road inventory identifies approximately 65 miles of road on BLM-managed lands in the WQRP area that are capable of delivering fine sediments to streams. Furthermore, approximately 10% of these road segments are not experiencing any traffic and are "passively" decommissioning, but still erode sediment from the road prism. The road inventory also identifies approximately 73 culverts on BLM-controlled road segments that are currently at high risk for failure because of undersized culverts and plugged culverts. The ratings used to determine high risk included the risk to fish streams and high numbers of at risk culverts along a road segment.

The 303(d) listing also identified year–round dissolved oxygen as a water quality problem for the Siuslaw River within the planning area (see Table 3). The stream segment between River Mile 20 and 105.9 was listed based on data collected near River Mile 20. Confirming data within the planning area is not available. Low dissolved oxygen is influenced by multiple factors, including stream temperature, low flows, shallow stream gradients, fresh organic matter inputs, and high respiration rates (MacDonald 1991). Some nutrients and organic chemicals may enter the water from fertilizing, livestock use, and spraying, especially in agricultural areas. The predominant agricultural areas that could influence dissolved oxygen at River Mile 20 include the upper Lake Creek, upper Wildcat Creek, and the Lorane area of the Siuslaw River headwaters. The Lorane area is located upstream of the planning area, while Lake Creek and Wildcat Creek are tributaries downstream of the planning area. Timber harvest on adjacent private lands will be unlikely to affect dissolved oxygen levels by contributing substantial organic material to streams: state rules direct private landowners to treat slash to minimize slash entry into streams (Oregon Administrative Rules 629-615-0000). However, timber harvest on adjacent private lands will continue to contribute to increased stream temperatures by reducing stream shading.

II. Goals and Objectives

The ACS was developed to prevent further degradation and restore the ecological health of watersheds over broad landscapes across USFS and BLM-administered lands within the range of the northern spotted owl. The ACS contains nine objectives that guide maintenance and restoration of watershed processes and water quality:

1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

5. Maintain and restore the sediment regime under which aquatic ecosystems evolved.

Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

In addition to the ACS objectives, the goals of the LSR Restoration Plan are to protect and enhance late-successional and old-growth forest ecosystems; foster the development of late-successional forest structure and composition in plantations and young forests; and reconnect streams and reconnect stream channel to their riparian areas and upslope areas.

The LSR Restoration Plan is consistent with the Aquatic Conservation Strategy and will maintain or restore Aquatic Conservation Strategy objectives.

Objective 1 - *Maintain and restore the distribution, diversity, and complexity of watershed and landscape scale features to ensure protection of the aquatic systems to which species, populations, and communities are uniquely adapted*.

The LSR Restoration Plan will restore the complexity of landscape scale features by speeding the development of late-successional forest structural characteristics (EIS, pp. 125-132, 135-136). The LSR Restoration Plan will thin approximately 8,400 acres during the 10-year span of the LSR Restoration Plan, of which 6,000 acres will develop late-successional forest structural characteristics within 100 years. Approximately 5,400 acres of the 13,800 acres of stands currently =80 years old will receive no treatment and will continue on their existing developmental pathway.

Objective 2 - *Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These lineages must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species*.

The LSR Restoration Plan will restore spatial and temporal connectivity within and between watersheds. The LSR Restoration Plan will open 7.0 miles of new coho salmon habitat by removing or replacing fish-barrier culverts, and will decommission 45 miles of existing road, increasing aquatic and riparian connectivity (EIS, pp. 121, 136). The LSR Restoration Plan will reduce the risk of catastrophic fire across the landscape and thus will reduce risks to existing late-successional forest which provide intact refugia (EIS, pp. 124). Thinning will speed the development of late-successional forest structural characteristics and therefore will contribute to the restoration of a network of late-successional forests in Riparian Reserves. New road construction will not affect aquatic and riparian connectivity because new road construction will be limited to temporary spur roads, which will be outside of Riparian Reserves and have no stream crossings.

Objective 3 - *Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations*.

The LSR Restoration Plan will maintain and restore the physical integrity of the aquatic system. The unthinned areas along streams will ensure that the thinning will not alter streambank integrity. Decommissioning of all non-shared, BLM-controlled roads that are capable of delivering fine sediment to streams will reduce sedimentation to streams (EIS, pp. 136, 176). Coarse woody debris creation will create in-stream structure that will reduce stream velocities, create deeper pools, and trap sediments (EIS, p. 135). Thinning of riparian stands will speed the development of large trees capable of creating key pieces of large woody debris in streams (EIS, pp. 135-136), which will further restore in-stream structure.

Objective 4 - *Maintain and restore water quality necessary to support healthy riparian, aquatic and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities*.

The LSR Restoration Plan will maintain or restore water quality, including stream temperature. Unthinned riparian areas will be established in the primary shade zone (the area that shades the stream from approximately 10 am to 2 pm) on all stream reaches to maintain stream shading (see "Additional Best Management Practices and Margin of Safety"). Increasing in-stream structure will provide stream shading and will improve water quality by creating deeper pools and replenishing groundwater reservoirs that are vital for water storage, water purification, and temperature regulation (EIS, p. 90).

The LSR Restoration Plan will reduce sedimentation and thereby reduce stream turbidity (see ACS Objective 5).

Contamination of streams with hazardous materials or fertilizers is very unlikely: no herbicides, pesticides, or fertilizer will be used as part of the LSR Restoration Plan. Use of petroleum products will be associated with the timber harvest and restoration actions, but reasonable precautions in the transport and use of equipment (including refueling) indicate a very low risk of contamination.

Creation of coarse woody debris is unlikely to result in low dissolved oxygen levels in streams. Large quantities of fine organic material could be introduced into small streams, which could affect dissolved oxygen levels. However, the streams in which restoration actions will occur typically exhibit cool water temperatures, low biochemical oxygen demand (BOD), and rapid aeration rates. Forest streams, especially 1^{st} and 2^{nd}-order streams, are typically at or close to saturation of dissolved oxygen. Although input of large quantities of fine organic material has the potential to increase biochemical oxygen demand (BOD) during low stream flow and high water temperatures, most forest streams have enough turbulence to maintain a high amount of dissolved oxygen in the water column, even during low flows. Many first-order streams, and some second-order streams, are intermittent channels and would not be expected to contribute to summer/fall BOD.

Objective 5 - *Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport*.

The LSR Restoration Plan will reduce sedimentation and contribute to restoration of water quality. Decommissioning of all non-shared, BLM-controlled roads that are capable of delivering fine sediment to streams will reduce sedimentation to streams (EIS, pp. 136, 176). Coarse woody debris creation will create in-stream structure that will reduce stream velocities and trap sediments (EIS, p. 135). Road decommissioning, culvert replacement, and creation of in-stream structure will create minor, temporary pulses of sediment, but will reduce sedimentation in the long-term (EIS, pp. 76-77, 176-177).

New road construction will be limited to temporary spur roads, which will be located outside of Riparian Reserve and will be built and decommissioned in the dry season of the same year. Therefore, new road construction and subsequent decommissioning will not result in any sedimentation to streams (EIS, p. 77).

Yarding of timber will not result in any sedimentation to streams, because slopes are generally gentle and stable in the project area; no harvest will occur on unstable slopes; and no harvest will occur within 100’ of all streams (EIS, p. 76).

Haul of timber will result in no more than negligible sedimentation to streams, because haul operations will be restricted to dry season conditions, except for specific, identified haul routes that have limited sediment delivery potential (see “Additional Best Management Practices and Margin of Safety”). These specific haul routes have substantial paved portions, and the unpaved portions have very few stream crossings (EIS, p. 76).

Objective 6 - *Maintain and restore instream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing (i.e., movement of woody debris through the aquatic system). The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected*.

The LSR Restoration Plan will maintain the flow regime. The planning area is of low elevation, and the watershed lacks any substantial areas in the transient snow zone in which rain-on-snow events are more likely (EIS, p. 29). Thinning could conceivably contribute to an increase in summer low flows and overall water yield, because of reduction in evapotranspiration and interception due to the removal of some of the trees. However, any effect would be minimal and immeasurable, because part of the canopy will be retained in thinned stands, and unthinned buffers will be maintained along streams. Some soil compaction could occur from yarding, but application of best management practices (BMPs) will mitigate compaction. New road construction will be limited to temporary spur roads outside of Riparian Reserves and will not be hydrologically connected to the stream network and therefore will have no potential to route water to the stream network.

Objective 7 - *Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands*.

The LSR Restoration Plan will maintain or restore floodplain inundation and water table elevation. The LSR Restoration Plan will have little effect on overall flow patterns, but the increase in in-stream structure will slow stream velocities, create deeper pools, and replenish groundwater reservoirs. This increase in in-stream structure will contribute to a restoration of patterns of floodplain inundation and water table elevation.

Objective 8 - *Maintain and restore the species composition and structural diversity of plant communities in riparian zones and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability*.

The LSR Restoration Plan will restore riparian plant communities by speeding the development of late-successional forest structural characteristics and restoring coarse woody debris quantities in riparian stands (EIS, pp. 135-136, 241). Thinning and other restoration actions in riparian stands will shift uniform Douglas-fir stands to structurally and compositionally diverse stands more similar to natural stands (EIS, pp. 125-132). Riparian areas in the primary shade zone on all stream reaches will be left unthinned to maintain stream shading and ensure streambank stability.

Objective 9 - *Maintain and restore habitat to support well distributed populations of native plant, invertebrate, and vertebrate riparian dependent species*.

The LSR Restoration Plan will restore habitat for riparian dependant species by speeding the development of late-successional forest structural characteristics and restoring coarse woody debris quantities in riparian stands (EIS, pp. 135-136, 241). Unthinned riparian areas in the primary shade zone will provide habitat for riparian dependant species that need undisturbed forest conditions.

III. Management Actions to Achieve Objectives

Planned Activities and Best Management Practices.

The Northwest Forest Plan (NWFP) describes only general guidance for managing riparian reserves (USDA Forest Service and USDI BLM, 1994). The BLM and USFS manage riparian reserves for a number of objectives, among them to enhance biodiversity, to enhance ecosystem function for fish, wildlife, and plants, and to reduce hazardous fuel loads; to remove vegetation that excludes natives, to enhance development of late-successional forest characteristics, and to increase large wood recruitment

Riparian reserves, key watersheds, watershed analysis, and watershed restoration components of the ACS are designed to operate together to maintain and restore the productivity and resiliency of riparian and aquatic ecosystems. In addition to the ACS, the NWFP describes land allocations and specific standards and guidelines (S&Gs) for managing these land allocations. These S&Gs effectively serve as BMPs to prevent or reduce water pollution further contributing to goals of Clean Water Act compliance.

Since the listing of impaired waters within the planning area, the BLM has continued to engage in stream temperature monitoring, instream fish improvement projects, and collected FLIR data for use in future planning.

The LSR Restoration Plan is designed to take advantage of restoration opportunities that would have the least short-term adverse effects with the most long-term benefits to habitat for northern spotted owls, marbled murrelets, and coho salmon. Thinning would be concentrated in younger stands and would have targets for a wide range of stand densities and high variability of tree spacing. Some cut trees would be removed from thinned stands to reduce the risk of fire and insect infestation. All stand thinning requiring timber removal would be completed within the next 10 years, and subsequent treatments, such as tree planting and snag and coarse woody debris creation, would not require road access.

Very young stands (=20 years old) would be thinned to variable spacing at low densities without any timber removal.

Young and mid-seral stands (21-60 years old) would be thinned to variable spacing at a wide range of densities with some timber removal. Shade-tolerant conifers would be planted at the time of thinning. Both very young and young stands would undergo subsequent coarse woody debris and snag creation every 10-20 years. Stands older than 60 years old would not be thinned.

Riparian areas (<100' from streams) which are conifer-dominated would be thinned without any timber removal. Thinned stands would undergo subsequent coarse woody debris and snag creation every 10-20 years. Shade-tolerant conifers would be planted at the time of subsequent coarse woody debris and snag creation. Approximately half of the riparian areas which are hardwood-dominated would be thinned, and conifers would be planted at the time of thinning.

In-stream structures would be constructed, and some structures would be cabled for stability in larger streams. Trees would be felled into all streams adjacent to stands =80 years old. All high-risk and fish-barrier culverts would be removed or replaced.

Non-shared roads capable of delivering sediment to streams, damaged roads, and roads within or adjacent to late-successional forest, would be decommissioned. Approximately 45 miles of existing road would be decommissioned. New road construction would be limited to temporary spur roads each less than 200 feet, resulting in a total of 3.6 miles of temporary new road construction over 10 years.

The EIS describes in detail the specific objectives, actions, guidelines, and mitigation measures of the LSR Restoration Plan (Upper Siuslaw LSR Restoration Plan EIS, Appendix A, pp. 233-245).

Additional Best Management Practices and Margin of Safety

The NWFP describes S&Gs that serve as BMPs to prevent or reduce water pollution in order to meet the goals of the CWA. The Resource Management Plans (RMPs) for the BLM include provisions to ensure attainment of ACS objectives. Often, these plans contain BMPs that are important for preventing and controlling to the “maximum extent practicable” non-point source pollution and achieve Oregon water quality standards. BMPs are developed on a site-specific basis and are presented for public comment during the NEPA process. One element of BMP implementation includes effectiveness monitoring and modification of BMPs when water quality goals are not being achieved.

If the BLM, and Oregon Department of Environmental Quality (ODEQ) agree that existing BMPs will result or are resulting in non-achievement of TMDL load allocations, the BLM will create additional watershed specific BMPs. If the BLM or ODEQ do not agree that BMPs will achieve the forestry load allocation in an applicable TMDL, these BMPs will, nonetheless, serve as interim BMPs. However, the BLM in consultation with ODEQ will design and implement a mutually agreeable monitoring program to gain information sufficient to determine whether or not existing BMPs will achieve the forestry load allocation. This monitoring program shall be a component of the implementation plan. If such monitoring demonstrates that existing BMPs will not achieve the forestry load allocation, then the USFS and BLM will create additional watershed specific BMPs to implement the load allocations and assure attainment of water quality standards.

In addition to the guidelines and mitigation measures presented in the EIS, the following BMPs would be implemented as part of the LSR Restoration Plan. These BMPs generally give greater detail to guidelines presented in the EIS. BMPs are intended to provide margin of safety with respect attainment of water quality critieria.

Stream Shading: The LSR Restoration Plan as described in the EIS contains the mitigation measure: "Maintain sufficient stream shading so as to avoid contributing to increased water temperature." Specifically, stream shading will be maintained by managing riparian stands in three zones (see Figure 4):

(1) The primary shade zone (see Table 6) will be maintained unthinned (approximately 1-2 trees per acre would be felled for large woody debris in streams, which will not alter stream shading). Primary shade zones will not be established on intermittent streams or on the north side of east-west oriented streams.

(2) Outside of the primary shade zone but <100’ from streams, stands will be thinned, but trees will not be harvested. Thinning will not result in more than a 50% reduction in canopy closure.

(3) Upland thinning prescriptions that may include timber harvest will be applied =100’ from streams. Trees that will be removed from outside this riparian zone are not contributing to stream shading, because the secondary shade zone extends to less than the distance of the average tree height for all but the steepest slopes (the average tree height is less than 100’ for all age classes that will be harvested except for the 51-60-year-old stands, for which the average tree height ranges from 109’ to 126’).

Figure 4. Riparian Management Zones

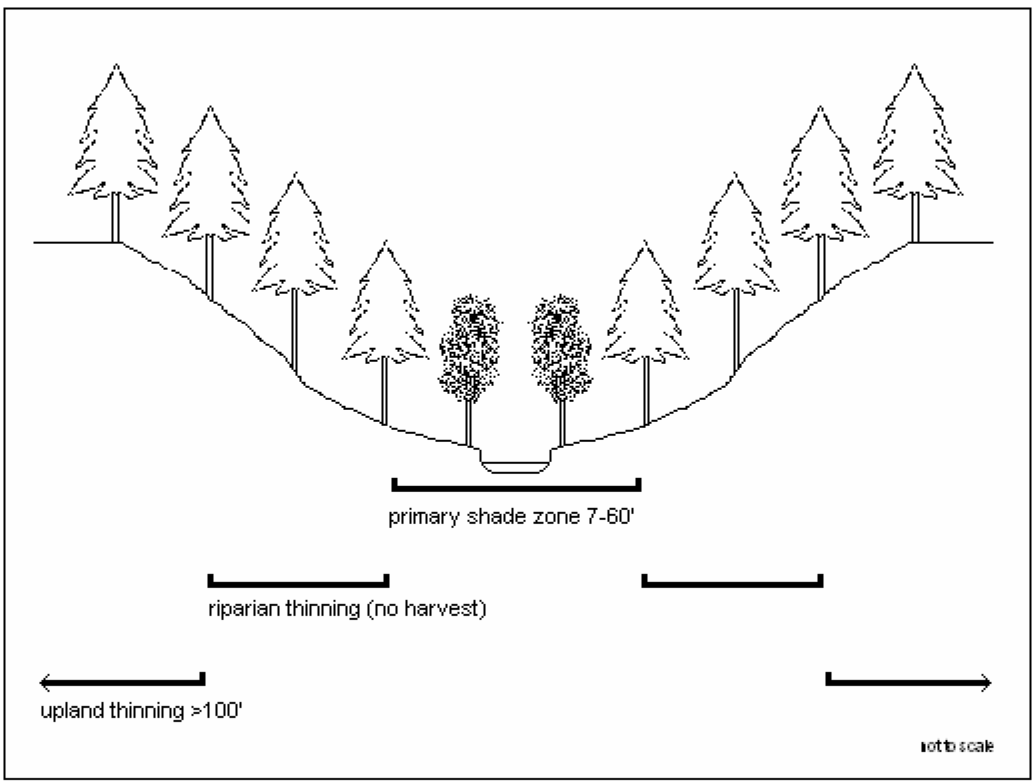


Table 6. Primary Shade Zones in the Planning Area.

Stand age (years)	Distance (feet from stream)		
	<30% slope	30-60% slope	>60% slope
=10	7	8	10
11-30	20	25	30
31-50	30	40	50
>50	40	50	60

Haul: Except for haul routes identified in Table 7, log haul operations will be restricted to dry season conditions: June 1 to September 15th. If weather conditions are favorable, the contractor may request a waiver from the authorized government representative to operate outside of these dates. If the Government grants permission to haul outside of these dates and conditions change, log haul will be stopped until dry conditions occur again.

The haul routes identified in Table 7 would not be seasonally restricted and may include log haul during wet conditions. Haul on these routes would result in no more than negligible amounts of sediment reaching streams, because many of these routes include substantial paved portions. None of the unpaved (gravel) portions cross fish-bearing streams, are adjacent (<25') to fish-bearing streams, or would otherwise have any potential for direct sediment delivery to fish-bearing streams. The unpaved portions of all haul routes identified in Table 7 include a total of two stream crossings. Fill slopes at each stream crossing are well-vegetated.

IV. Timeline For Implementation

The NWFP was implemented with the signing of the Record of Decision on April 13, 1994. Inherent in the implementation is the passive restoration of riparian areas that ensues as a result of the riparian reserve buffers/allocation. Implementation of active restoration areas beyond the inherent passive riparian restoration occurs with watershed analysis and site-specific projects.

The target date for completion of TMDLs for 303(d) listed waters in the Siuslaw Basin is 2008 (http://www.deq.state.or.us/wq/303dlist/TMDLTargetsMap.htm).

All actions identified in the LSR Restoration Plan will be implemented in the next 10 years. The LSR Restoration Plan also identifies reasonably foreseeable actions that may be implemented beyond 10 years, but these actions would require additional analysis under the National Environmental Policy Act. The timing for implementation of those activities beyond the 10-year LSR Restoration Plan will be dependent on funding and staffing levels.

Thinning in young riparian forests will speed the development of large trees capable of providing stable key pieces of woody debris. In 100 years, 92% of the currently young riparian stands (currently <80 years old) will have developed a sufficient supply of very large trees (=32" dbh) to provide an adequate supply of stable key pieces of woody debris (EIS, pp. 66-69, 75-76, 135-136). Without thinning, only 74% of the currently young riparian stands would develop a sufficient supply of very large trees in 100 years (EIS, pp. 85-87).

Thinning in young riparian forests will also speed the overall development of late-successional forest structure and composition. In 100 years, 26% of the currently young riparian stands will have developed late-successional structure. Without thinning, none of the currently young riparian stands would develop late-successional structure in 100 years (EIS, p. 90). As riparian stands move along the trajectory to late-successional structure, aquatic systems structure and processes will respond with increases in structure (increased woody debris), shifts in nutrient cycling patterns which could effect BOD, improved riparian connectivity, and improved cooler subsurface contributions to channels. Instream conditions will recover as large conifers begin to enter the stream channels through felling, blowdown, or debris flows.

Shade recovery on tributaries is not a significant issue because a high level of shading currently exists. As a result of management actions, shade composition will shift from even-aged young stands to stands with late-successional structure. Maintenance of the primary shade zone along streams will be essential to the maintenance and improvement of stream shade over time.

V. Identification of Responsible Parties

The BLM has signed a Memoradum of Agreement (MOA) with ODEQ that provides a framework for effective cooperation on programs and projects that pursue the shared goal of attainment of state water quality standards. The MOA identifies responsible parties for the development and implementation of the MOA statewide.

This plan was produced as a joint activity by the ODEQ and the BLM. As a Designated Management Agency with responsibility for maintaining the quality of waters on the 303(d) list that flow across the lands it manages, BLM will implement the actions identified in the plan The Field Manager for the Siuslaw Resource Area of the Eugene District is the responsible official for implementation of this plan. Private landowners are not required to follow the specific provisions contained in this plan.

BLM contact: Steven Calish, Field Manager, Siuslaw Resource Area, Eugene District.

VI. Reasonable Assurance

Implementation and monitoring of the ACS provides reasonable assurance that watersheds under the direction of the NWFP will move towards attainment of water quality standards and beneficial use support. Implementation and adaptation of the MOAs also provide reasonable assurances that water quality protection and restoration on lands administered by the BLM will progress in an effective, non-duplicative manner on priority waters.

In response to environmental concerns and litigation related to timber harvest and other operations on federal lands, the United States Forest Service and the BLM commissioned the Forest Ecosystem Management Assessment Team (FEMAT) to formulate and assess the consequences of management options. The assessment emphasizes producing management alternatives that comply with existing laws and maintaining the highest contribution of economic and social well being. The “backbone” of ecosystem management is recognized as constructing a network of late-successional forests and an interim and long-term scheme that protects aquatic and associated riparian habitats adequate to provide for threatened species and at risk species. Biological objectives of the NWFP include assuring adequate habitat on federal lands to aid the “recovery” of late-successional forest habitat-associated species listed as threatened under the Endangered Species Act and preventing species from being listed under the Endangered Species Act.

All management activities on BLM-managed lands in the WQRP area must follow standards and guidelines listed in the Eugene District Resource Management Plan (RMP), which is supported by and consistent with the NWFP. In addition, BLM has proposed and analyzed the LSR Restoration Plan to implement direction in the Eugene District RMP. The LSR Restoration Plan contains additional guidelines and mitigation measures that add specificity and detail to the Eugene District RMP standards and guidelines. The Annual Program Summary highlights the Eugene District’s RMP accomplishments, implementation, and monitoring. If monitoring indicates that sufficient progress toward the goals contained in this plan are not being met, the goals and activities will be revisited and changes made as necessary to assure contributions to the attainment of water quality standards.

VII. Monitoring and Evaluation

Monitoring to meet water quality objectives will provide the necessary information to evaluate the range of natural conditions, distribution of water quality parameters, and definition of dominant watershed processes. Monitoring will be necessary to identify sources of point and non-point source pollution, to identify causal factors for water quality and watershed condition, to understand the magnitude of effect of management actions, and to document the effects of restoration actions.

Monitoring will be used to ensure that decisions and priorities conveyed by BLM plans are being implemented, to document progress toward attainment of state water quality standards, to identify whether resource management objectives are being attained, and to document whether mitigating measures and other management direction are effective.

The NWFP provides the framework to accommodate a nested analysis, based on scale (region, province, sub-basin, watershed, and site) of monitoring information in order to assess the overall effects of management activities. The NWFP monitoring framework requires implementation, effectiveness, and validation monitoring to meet objectives and evaluate the efficacy of management practices. At a minimum, monitoring should:

- Detect changes in ecological systems from both individual and cumulative management actions and natural events
- Provide a basis for natural resource policy decisions
- Provide standardized data
- Compile information systematically
- Link overall information management strategies for consistent implementation
- Ensure prompt analysis and application of data in the adaptive management process
- Distribute results in a timely manner

The NWFP requires that if results of monitoring indicate management is not achieving ACS objectives, among them water quality, plan amendments may be required to redirect management toward attainment of state water quality standards.

ODEQ will evaluate progress of actions to attain water quality standards after TMDLs are developed and implemented. If, for any particular TMDL, ODEQ determines that implementation is not proceeding or if implementation measures are in place, but water quality standards are not or will not be attained, or the load allocations or wasteload allocations for the TMDL are not or will not be attained, then ODEQ will assess the situation and work with the BLM to take appropriate action. Such action may include additional implementation measures, modifications to the TMDL, and/or placing the water body on the 303(d) list when the list is next submitted to EPA.

Implementation Monitoring

As directed by the NWFP, a sample of all projects must be visited annually to verify that actions were implemented in a manner consistent with the S&Gs. Projects implemented under the LSR Restoration Plan will be evaluated as part of this implementation monitoring.

Effectiveness Monitoring

<u>Shade:</u> A sample of riparian stand treatments will be measured to evaluate changes in shade. Measurement of crown closure will be made in a manner that can be repeated within the stream-adjacent stand within one tree height of the stream bank at bankfull width. The measurements will occur within the stand and not be influenced by the opening over the actual stream channel. The measurement will be conducted before and immediately after treatment to assess the effect of treatment on short-term canopy shade. Measurements will be repeated at a decadal interval, dependent on funding and staffing levels, to assess shade development as a component of developing late-successional stand characteristics.

Stream Temperature: BLM will continue monitoring stream temperatures within the planning area. The Eugene District has been collecting temperature data and additional site characterization information at over 30 sites in the Siuslaw Basin in the past 5 years. Within the planning area, there are currently 3 monitoring sites established on the Siuslaw River, and 7 on key tributaries: Bear Creek, Haight Creek, Pheasant Creek, Doe Hollow Creek, Bottle Creek, Doe Creek, and Russell Creek (see Map 10). Temperature monitoring will occur at these sites annually during the 10-year implementation period and, at a minimum, twice per decade thereafter, dependent on funding and staffing levels. Additional sites may be added based on specific-site needs and data collection opportunities.

Stream temperatures will generally be measured from June 15 – September 30 to insure that critical high temperature periods are covered. Measurements will be made with sensors programmed to record hourly samples. Qualified personnel will review raw data and erroneous data due to unit malfunction or other factors will be deleted. The resulting file will be stored in the agency computer system and be made available to the ODEQ and other interested parties.

Dissolved Oxygen: In accordance with the *Forest Service and Bureau of Land Management Protocol for Addressing Clean Water Act Section 303(d) Listed Waters, Version 2.0*, the first step in the decision framework is to validate the listing. Siuslaw River segments in the planning area are listed for dissolved oxygen (DO) based on data collected at a site which is over 50 miles downstream of the planning area and is influenced by a combination of agricultural, forestry, and rural uses. Monitoring techniques will use a combination of probes, field and laboratory DO analysis techniques. The results of the data will help BLM adjust management sensitivity regarding organic inputs and other aspect of management practices that could potentially affect DO levels.

The second and third steps of the decision framework are to determine if DO is related to BLM management and if sufficiently stringent measures are in place, respectively. If monitoring indicates that DO is a concern within the planning area, BLM will evaluate if the impairment is contributed to by BLM management actions. If BLM management actions are determined to contribute to DO impairment, BMPs in the LSR Restoration plan will be re-evaluated to determine if they are stringent enough to promote DO improvement. Subsequent monitoring will occur to assess if BMP changes are adequate.

Reporting

Implementation and effectiveness monitoring will be reported as a component of the Annual Program Summary.

VIII. Public Involvement

The Federal Land Policy and Management Act (FLPMA) and the NEPA require public participation for any activities proposed for federal lands. In addition, the BLM will assist ODEQ in public involvement activities as required as part of TMDL development.

In addition to the public involvement for the development of the NWFP and the Eugene District RMP, BLM conducted extensive public involvement for the development of the LSR Restoration Plan.

BLM began informal scoping for the LSR Restoration plan in 2000, including distributing information to initiate issue identification and to open public dialogue regarding the LSR Restoration Plan. During 2001, BLM solicited public participation through a series of public meetings and field trips. BLM issued newsletters about LSR restoration and this LSR Restoration Plan announcing field trips or public meetings, addressing questions from the public, and describing preliminary issues and alternatives.

BLM published a Notice of Intent to prepare an EIS in the Federal Register on October 9, 2002, beginning the formal scoping period. The Notice of Intent requested comments on the scope of the analysis for the proposed LSR Restoration Plan.

The public comment period for the draft EIS began on August 15, 2003 and closed on October 15, 2003. BLM mailed the draft EIS to agencies, organizations, and individuals listed in the EIS (p. 184), and made the draft EIS available on the internet. BLM also made presentations of the draft EIS to interested groups during the comment period.

The final EIS was published on April 9, 2004.

BLM notified the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians, and the Confederated Tribes of the Grand Ronde of this project during the scoping process, requesting information regarding tribal issues or concerns relative to the project. BLM also sent the tribes copies of the EIS. BLM received no responses.

The Record of Decision for the LSR Restoration Plan, to which this WQRP will be attached, will be advertised in the Eugene Register-Guard, and the Record of Decision will then be subject to protest. Specific actions under the LSR Restoration Plan will have additional opportunities for administrative review, as described in the Record of Decision.

IX. Maintenance of Effort over Time

The management actions described in the LSR Restoration Plan are designed to address factors that influence the development of late-successional forest characteristics and reconnecting aquatic and riparian ecosystems. The maintenance and improvement of water quality is expected to be a benefit of the management actions. Restoring riparian processes and water quality will require sustained effort of multiple decades. The management recommendations will provide guidance for long-term restoration of impaired and 303(d)-contributing streams within the planning area. The BLM will implement these measures through both passive and active restoration projects. Short-term emphasis will be placed on establishing a trajectory for the development of late-successional characteristics in younger, even-aged stands without impairing water quality.

The LSR Restoration Plan is a 10-year plan. However, some additional minor actions will likely follow the 10-year plan, and implementation benefits and monitoring will extend decades beyond active stand management.

X. Funding

Annual costs for implementation of the entire LSR Restoration Plan will average approximately $240,000 in contract costs and $640,000 in BLM staff costs (in 2002 dollars). Annual revenue generated from implementation will average approximately $1,160,000, which will exceed costs, indicating the feasibility of implementing the overall restoration plan (EIS, pp. 78-79, 137). Actual annual costs and revenues will likely vary from these averages over the 10-year implementation period.

Funding for project implementation and monitoring will be derived from a number of sources. Implementation of proposed action discussed in this document will be contingent upon securing adequate funding.

Funds for project implementation will originate from Congressional appropriations, specific budget requests, grants, cost share projects, or other sources. Potential sources of funding include the Oregon Watershed Enhancement Board, and the BLM Clean Water and Watershed Restoration Funds. It is expected that LSR Restoration projects will be funded primarily from appropriated funds and special budget requests. Much of the planning for the LSR Restoration Plan has been funded by the BLM Forest Ecosystem Health and Recovery Fund, from which BLM anticipates continued funding for implementation of the LSR Restoration Plan.

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